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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/599,661

**Applicant(s)**

SEKI ET AL.

**Examiner**

YU CHEN

**Art Unit**

2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 23 June 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) 5 and 6 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SG/US)  
Paper No(s)/Mail Date 05/21/2009
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

This Office Action is in response to amendment filed 23 June 2009.

Claims 1 and 3 are amended.

Claims 1-6 are pending.

Claims 5 and 6 were withdrawn.

### ***Response to Arguments***

Applicant's arguments with respect to claims 1-4 have been considered but are moot in view of the new ground(s) of rejection.

### ***Claim Objections***

Claim 1 is objected to because of the following informalities:

In claim 1, line 5, change "Pd alloy plated later" to "Pd alloy-plated layer" to correct a typographical error. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-4 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one

skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claims 1 and 3 recites "Pd or a Pd alloy is plated ... only on the surface of a plurality of external connection terminals without interposing any underlying layer or any intermediate metal layer, and the surfaces of inner leads are plated with silver". Neither the specification nor the drawings provides adequate description for these new limitations. The specification describes an Ag-plated lead frame is plated with Pd on the outer leads (Page 9, lines 5-13), which suggest the entire lead frame, including the outer leads, is first plated with Ag, and the outer leads are then plated with Pd. No specific description recites the removal of Ag on the outer leads before plating Pd. Therefore, the Pd on the outer leads is plated with an underlying Ag layer according to the specification. Therefore, the limitations in claims 1 and 3, reciting "Pd ... plated without interposing any underlying layer or any intermediate metal layer" and "inner leads are plated with silver" constitute new matter as is best understood.

Other claims are rejected for dependence on rejected claims.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-4 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 1 and 3, the limitation "the surfaces of inner leads are plated with silver" renders the claim indefinite because it unclear where are "the surfaces", i.e.

whether "the surfaces" pertain to only a specific surface of each inner lead.

Furthermore, it is unclear where and how the "inner leads" relate to the rest of the device structure claimed.

Other claims are rejected for dependence on rejected claims.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 and 3, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuji et al. (US Patent No. 5,521,432; hereinafter Tsuji).

In re claims 1 and 3, Tsuji discloses a conventional palladium-plated lead finishing structure characterized in that Pd or a Pd alloy is plated to a thickness of 0.1-1.5  $\mu\text{m}$  (Column 1, lines 60-64) on the surfaces of a plurality of external connection terminals of a semiconductor part using a copper alloy-based material or an iron-nickel based material (Column 1, lines 36-39), without interposing any underlying layer or any intermediate metal layer between said material and said Pd- or Pd alloy-plated layer (Column 5, lines 56-62). Furthermore, Tsuji discloses (e.g. FIG. 9) a palladium-plated lead finishing structure 4 characterized in that Pd or a Pd alloy 21 is plated to a thickness of 0.1-1.5  $\mu\text{m}$  (Column 4, lines 35-38) only on the surfaces of a plurality of external connection terminals of a semiconductor part 4-1 without interposing any

underlying layer or any intermediate metal layer between said material and said Pd- or Pd alloy-plated layer 21, and the surfaces of inner leads are plated with silver 23.

Although Tsuji does not explicitly disclose the conventional copper alloy or iron-nickel alloy lead has the structure of FIG. 9 wherein an inner portion of the lead is plated with silver while an outer portion is plated with palladium, it would have been obvious to one having ordinary skill in the art at the time the invention was made to plate a conventional copper alloy or iron-nickel alloy lead as in FIG. 9 so as to facilitate bonding wire connection to a semiconductor chip with the silver plating on the inner lead portion (Column 6, lines 48-57) and to reduce manufacturing cost by plating palladium only on the outer lead portion (Column 7, lines 4-8). Although Tsuji does not explicitly disclose Pd is plated to a thickness of not more than 0.3  $\mu\text{m}$ , it would have been obvious to one having ordinary skill in the art at the time the invention was made to plate the Pd layer to a desired thickness by controlling the plating time (Column 4, lines 35-38), since it has been held that where the general conditions for a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Claims 2 and 4, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuji as applied, respectively to claims 1 and 3 above, and further in view of Wakabayashi et al. (EP Patent Publication no. 0474499 (previously cited); hereinafter Wakabayashi).

In re claims 2 and 4, Tsuji discloses the palladium-plated lead structure having a layer of Pd plated on a copper alloy or iron-nickel alloy lead. However, Tsuji does not

disclose Au or an Au alloy is plated to a thickness of not more than 0.1  $\mu\text{m}$  on the top of said Pd layer. Wakabayashi discloses an Au-plated film, having a monatomic layer thickness to 0.1  $\mu\text{m}$ , on a Pd or Pd-alloy film plated on a copper or copper alloy or Fe-Ni alloy lead (Page 3, lines 3-28). The provision of the Au-plated film improves the ratios of soldering wet area. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Tsuji to further plate an Au film on the Pd-plated layer for improving soldering wet area as disclosed by Wakabayashi.

Claims 1-4, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Chae et al. (KR2003-003566A; hereinafter Chae) in view of Kim et al. (US Patent No. 5,957,607; hereinafter Kim).

In re claims 1 and 3, Chae discloses (e.g. FIG. 4) a palladium-plated lead finishing structure 30 characterized in that Pd or a Pd alloy 70 is plated only on the surfaces of a plurality of external connection terminals 33 of a semiconductor part using copper or iron based material (Page 3, first paragraph), and the surfaces of inner leads 32 are plated with silver 80. Chae does not disclose the Pd is plated without interposing any underlying layer or any intermediate metal layer between said material and said Pd- or Pd alloy-plated layer. However, Kim discloses (e.g. FIG. 5) Pd alloy 52 plated directly on the metal lead for eliminating metal diffusion and cracking caused by intermediate layers (Column 2, lines 34-47). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Chae

to plate the Pd directly on the metal base to eliminate metal diffusion and cracking as disclosed by Kim. Furthermore, Kim discloses the Pd is plated to a thickness of 0.1 to 2  $\mu\text{m}$  (Column 3, lines 25-27), for example "approximately" 0.5  $\mu\text{m}$  (Column 3, lines 45-48). Although Chae in view of Kim does not explicitly disclose Pd is plated to a thickness of not more than 0.3  $\mu\text{m}$ , it would have been obvious to one having ordinary skill in the art at the time the invention was made to plate the Pd layer to a desired thickness (Column 3, lines 28-32), since it has been held that where the general conditions for a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

In re claims 2 and 4, Kim discloses Au composites exist on the outer most layer of the lead frame for enhancing wire bonding (Column 3, lines 38-42). The limitation "plated to a thickness of not more than 0.1  $\mu\text{m}$ " is a product by process limitation. In regard to the product by process language, since a "product by process" claim is directed to the product per se, no matter how actually made, *In re Hirao and Sato et al.*, 190 USPQ 15 at 17 (CCPA 1976) (footnote 3); see also *In re Brown and Saffer*, 173 USPQ 685 (CCPA 1972); *In re Luck and Gainer*, 177 USPQ 523 (CCPA 1973); *In re Fessmann*, 180 USPQ 324 (CCPA 1974); and *In re Marosi et al.*, 218 USPQ 289 (CAFC 1983). It is the final product per se which must be determined for patentability in a "product by, all of" claim, and not the patentability of the process, and that an old or obvious product, whether claimed in "product by process" claims or not, is not patentable. Note that Applicant has the burden of proof in such cases, as the above



case law makes clear. Even though product-by-process claims are limited by and defined by the process, determination of patentability is based upon the product itself. The patentability of a product does not depend on its method of production. If the product in product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product is made by a different process. *In re Thorpe*, 227 USPQ 964, 966 (Fed. Cir. 1985). Furthermore, although Kim does not explicitly disclose the Au composites is not more than 0.1  $\mu\text{m}$  thick, it would have been obvious to one having ordinary skill in the art at the time the invention was made to form a thin layer of Au composite for enhancing wire bonding, since it has been held that where the general conditions for a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Abbott et al. (US Patent No. 7,268,415 B2) pertains a lead from comprising an outer lead portion plated with Pd and an inner lead portion plated with silver (e.g. FIG. 1).

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to YU CHEN whose telephone number is 571-270-7881. The examiner can normally be reached on Monday-Friday 8:30AM-5:00PM EDT.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Parker can be reached on 571-272-2298. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/YU CHEN/  
Examiner, Art Unit 2815

/Jerome Jackson Jr./  
Primary Examiner, Art Unit 2815